

REMARKS/ARGUMENTS

This paper is in response to the Office Action dated August 1, 2011. In the Office Action, Claims 1-5, 9, 12-13, 16, and 18-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Application Pub. No. 2003/0219341 to Dovey et al. in further view of U.S. Patent Application Pub. No. 2003/0044286 to Kim (hereinafter “Kim (‘286)’”); Claims 1-5, 9, 12-13, 16, and 18-30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Dovey and Kim (‘286) and further in view of U.S. Patent No. 6,176,683 to Yang; Claims 6-7, 10-11, 14, and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Dovey and Kim (‘286), or Dovey, Kim (‘286), and Yang, in further view of U.S. Patent No. 5,224,835 to Oltman; Claims 8 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Dovey and Kim (‘286) in view of Oltman and further in view of Yang; Claims 8 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Dovey, Kim (‘286), and Yang in view of Oltman; Claim 31 was rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,179,630 to Stuber or U.S. Patent Application Pub. No. 2003/0161734 to Kim (hereinafter “Kim (‘734)’”) in further view of Dovey and Kim (‘286). In response, Applicant has amended Claims 1, 12, 18-19, 27, and 30 to further clarify the present invention. The Examiner’s further consideration of this application is requested in light of the amendments made above and the following comments.

The present invention generally relates to a fluid pump or compressor that performs a calibration procedure to optimize piston displacement within the cylinder of the pump or compressor, which helps reduce collisions between the piston and the cylinder during normal operation. The calibration procedure generally involves successively incrementing the piston displacement stroke until an impact is caused by the piston at the stroke end. The maximum value of piston displacement is thereby determined and stored. As noted above, the Office Action rejected independent Claims 1, 12, 18, 27, and 30 of the present invention under 35 U.S.C. § 103(a) as being unpatentable over both the combination of Dovey and Kim as well as the combination of Dovey, Kim, and Yang.

Dovey generally discloses a vacuum pump incorporating a reciprocating piston for which a vibration sensor is used to control the piston stroke in order to avoid or prevent collisions. In particular, Dovey discloses a vibration sensor mounted on a vacuum pump having a piston moving between two ends of a cylinder. If the vibration sensor detects a collision between the piston and either end point of the cylinder, the sensor sends a signal to the pump controller to reduce the drive voltage thereby reducing the piston stroke length. Dovey then continues to monitor the vibration sensor output to detect further collisions during operation of the vacuum pump.

The Office Action suggests that Dovey teaches a calibration having an initial reading where the voltage increases until the vibration occurs. Applicant respectfully disagrees, noting that Dovey does not teach increasing the voltage until the vibration occurs but rather increasing the voltage and determining whether a vibration occurs. In particular, Dovey states that a “controller . . . control[s] movement of the driver and piston to maximize piston stroke and reduce if not eliminate contacting of the piston with the cylinder” (Dovey, Abstract). Additionally, Dovey states “[t]he controller 2 is set to deliver a gradually increasing voltage across the driver 4. This has the effect of gradually increasing the stroke length of the piston 5. Should the end of the piston 5 strike an end plate at either end 6, 7 of the pump cylinder 1, this is detected by the vibration sensor 3” (Dovey, col. 2, lines 13-19). Therefore, Dovey makes clear that an impact between the piston and end plate does not necessarily occur. For example, operation of the pump may be sufficiently brief such that a collision is never caused. Accordingly, Dovey fails to teach or suggest causing an impact with a piston and stroke end during a calibration procedure, as recited in amended independent Claims 1, 12, 18, 27, and 30.

Independent Claims 1, 12, and 30 further recite that the calibration procedure is performed prior to operation and in response to receiving an impact signal during operation. The Office Action concedes that Dovey fails to disclose the calibration procedure being run after an initial calibration. Instead, the Office Action cites Kim as curing this deficiency of Dovey. In particular, the Office Action suggests that Kim describes a recalibration method that is performed after an impact is detected. Applicant submits, however, that Kim does not teach a

recalibration method, but rather simply resets a maximum amplitude value to a smaller value if a collision is detected. Simply decreasing the maximum amplitude after detecting an impact to avoid future collisions is not the same as performing a calibration procedure comprising successively incrementing the piston displacement stroke to cause a calibration impact to determine and store a maximum value of piston displacement.

The Yang reference does not cure these deficiencies of Dovey and Kim, and is not cited as doing so. Rather, the Office Action cites Yang for its alleged teachings related to the storage of a maximum value of piston displacement. Accordingly, Dovey, Kim, and Yang, whether considered alone or in combination, fail to teach or suggest all of the recitations of independent Claims 1, 12, 18, 27, and 30.

Furthermore, Applicant respectfully asserts that none of the cited references describe a calibration procedure as recited in the independent claims. To the contrary, the cited references are generally directed to avoiding collisions during normal operation, and recovering from collisions should they occur. None of the references specifically teaches or suggests performing a calibration procedure involving intentionally causing a collision to occur as a means for calibrating the pump or compressor either prior to normal operation or in response to detecting an impact during operation. The cited references all focus on methods for avoiding any impacts, likely due to the potential hazards to the pump or compressor of a collision occurring during normal operation. The claimed invention, however, provides a solution in the form of a calibration procedure that is performed outside of normal operation, for example in a controlled environment, when an impact may be intentionally caused while the potential hazards are reduced.

For at least these reasons, Applicant respectfully submits that Dovey, Kim, and Yang, whether considered alone or in combination, fail to teach or suggest each and every recitation of independent Claims 1, 12, 18, 27, and 30, as amended. Accordingly, it is submitted that Claims 1, 12, 18, 27, and 30 are patentably distinct from the cited references. For similar reasons,

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Applicant submits that independent Claim 31, which recites an environment cooler comprising a control system as defined in Claim 1, is further patentable over the cited references.

The Applicant has made significant contributions to the art which are neither taught nor suggested by the cited prior art. Accordingly, it is submitted that the application is now in condition for allowance and such action is respectfully submitted. Should the Examiner have any questions, comments or proposed claim amendments, he is encouraged to contact the undersigned by telephone so that allowance of this application can be expedited.

The patentability of the independent claim has been argued as set forth above and thus the Applicant will not take this opportunity to argue the merits of the rejection with regard to the dependent claims. However, the Applicant does not concede that the dependent claims are not independently patentable and reserves the right to argue the patentability of the dependent claims at a later date if necessary.

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It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefor (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

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ELECTRONICALLY FILED USING THE EFS-WEB ELECTRONIC FILING SYSTEM OF THE UNITED STATES PATENT & TRADEMARK OFFICE ON NOVEMBER 1, 2011.